

CLAIMS

We Claim:

1. An electrolyte for used in a lithium cell or battery containing a lithium metal phosphate cathode wherein the electrolyte comprises a metal salt and ethyl methyl carbonate, propylene carbonate, diethyl carbonate and ethylene carbonate.
2. An electrolyte according to claim 1 wherein ethyl methyl carbonate is present in an amount from about 10 to about 80 wt %.
3. An electrolyte according to claim 2 wherein the ethylene carbonate is present in an amount from about 20 to about 80 wt %.
4. An electrolyte according to claim 3 wherein the propylene carbonate is present in an amount from about 0 to about 20 wt %.
5. An electrolyte according to claim 4 wherein the diethyl carbonate is present in an amount from about 0 to about 30 wt %.
6. An electrolyte according to claim 1 wherein the ethyl methyl carbonate is present in an amount from about 10 to about 40 wt %.
7. An electrolyte according to claim 6 wherein the ethylene carbonate is present in an amount from about 30 to about 70 wt %.

8. An electrolyte according to claim 6 wherein the ethylene carbonate is present in amount of about 50 to about 70 wt %.

9. An electrolyte according to claim 7 wherein the propylene carbonate is present in an amount from about 2 to about 10 wt %.

10. An electrolyte according to claim 9 wherein the propylene carbonate is present in an amount of about 5 wt %.

11. An electrolyte according to claim 9 wherein the diethyl carbonate is present in an amount from about 5 to about 30 wt %.

12. An electrolyte according to claim 1 wherein the ethylene carbonate is present in an amount of about 60 wt %; wherein the propylene carbonate is present in an amount of about 5 wt %; wherein the diethyl carbonate is present in an amount of about 10 wt % and wherein the ethyl methyl carbonate is present in an amount of about 25 wt %.

13. An electrolyte according to claim 1 wherein the ethylene carbonate is present in an amount of about 60 wt %; wherein the propylene carbonate is present in an amount of about 5 wt %; wherein the diethyl carbonate is present in an amount of about 25 wt % and wherein the ethyl methyl carbonate is present in an amount of about 10 wt %.

14. An electrolyte according to claim 1 wherein the ethylene carbonate is present in an amount of about 60 wt %; wherein the propylene carbonate is present in an amount of about 5 wt %; wherein the diethyl carbonate is present in an amount of about 5 wt % and wherein the ethyl methyl carbonate is present in an amount of about 30 wt %.

15. A lithium cell or battery comprising at least one positive electrode, and at least one counter negative electrode, such positive and negative counter electrodes alternately layered with separators interposed between such counter electrodes and an electrolyte dispersed therein wherein the positive electrode is comprised of a metal phosphate active material and wherein the electrolyte comprises a metal salt and a solvent mixture comprised of ethylene carbonate, propylene carbonate, diethyl carbonate and ethyl methyl carbonate.

16. A battery according to claim 15 wherein the positive electrode is comprised of $\text{LiMg}_x\text{Fe}_{1-x}\text{PO}_4$ wherein x is from about 0.01 to about 0.15.

17. A battery according to claim 15 wherein the positive electrode is comprised of a lithium vanadium phosphate active material.

18. A battery according to claim 15 wherein the ethyl methyl carbonate is present in an amount from about 10 to about 80 wt %.

19. A battery according to claim 18 wherein the ethylene carbonate is present in an amount from about 20 to about 80 wt %.

20. A battery according to claim 19 wherein the propylene carbonate is present in an amount from about 2 to about 20 wt %.

21. A battery according to claim 20 wherein the diethyl carbonate is present in an amount from about 2 to about 30 wt %.

22. A battery according to claim 15 wherein the ethyl methyl carbonate is present in an amount from about 10 to about 40 wt %.

23. A battery according to claim 22 wherein the ethylene carbonate is present in an amount from about 50 to about 70 wt %.

24. A battery according to claim 23 wherein the ethylene carbonate is present in an amount of about 60 wt %.

25. A battery according to claim 24 wherein the propylene carbonate is present in an amount from about 2 to about 10 wt %.

26. A battery according to claim 25 wherein the propylene carbonate is present in an amount of about 5 wt %.

27. A battery according to claim 26 wherein the diethyl carbonate is present in an amount from about 5 to about 30 wt %.

28. A battery according to claim 15 wherein the ethylene carbonate, propylene carbonate, diethyl carbonate, and ethyl methyl carbonate are present in amounts of about 60:5:10:25 wt %.

29. A battery according to claim 15 wherein the ethylene carbonate, propylene carbonate, diethyl carbonate, and ethyl methyl carbonate are present in amounts of about 60:5:25:10 wt %.

30. A battery according to claim 15 wherein the ethylene carbonate, propylene carbonate, diethyl carbonate and ethyl methyl carbonate are present in amounts of about 60:5:5:30 wt %.

31. A battery according to claim 16 wherein the ethyl methyl carbonate is present in an amount from about 10 to about 40 wt %.

32. A battery according to claim 31 wherein the ethylene carbonate is present in an amount from about 30 to about 70 wt %.

33. A battery according to claim 32 wherein the propylene carbonate is present in an amount from about 2 to about 20 wt %.

34. A battery according to claim 33 wherein the diethyl carbonate is present in an amount from about 2 to about 30 wt %.

35. A battery according to claim 16 wherein the ethyl methyl carbonate is present in an amount from about 10 to about 30 wt %.

36. A battery according to claim 35 wherein the ethylene carbonate is present in an amount from about 50 to about 70 wt %.

37. A battery according to claim 36 wherein the ethylene carbonate is present in an amount of about 60 wt %.

38. A battery according to claim 37 wherein the propylene carbonate is present in an amount from about 2 to about 10 wt %.

39. A battery according to claim 38 wherein the propylene carbonate is present in an amount of about 5 wt %.

40. A battery according to claim 39 wherein the diethyl carbonate is present in an amount from about 5 to about 30 wt %.

41. A battery according to claim 16 wherein the ethylene carbonate, propylene carbonate, diethyl carbonate, and ethyl methyl carbonate are present in amounts of about 60:5:10:25 wt %.

42. A battery according to claim 16 wherein the ethylene carbonate, propylene carbonate, diethyl carbonate, and ethyl methyl carbonate are present in amounts of about 60:5:25:10 wt %.

43. A battery according to claim 16 wherein the ethylene carbonate, propylene carbonate, diethyl carbonate and ethyl methyl carbonate are present in amounts of about 60:5:5:30 wt %.

44. A battery according to claim 17 wherein the ethyl methyl carbonate is present in an amount from about 10 to about 40 wt %.

45. A battery according to claim 44 wherein the ethylene carbonate is present in an amount from about 30 to about 70 wt %.

46. A battery according to claim 45 wherein the propylene carbonate is present in an amount from about 2 to about 20 wt %.

47. A battery according to claim 46 wherein the diethyl carbonate is present in an amount from about 2 to about 30 wt %.

48. A battery according to claim 17 wherein the ethyl methyl carbonate is present in an amount from about 10 to about 30 wt %.

49. A battery according to claim 48 wherein the ethylene carbonate is present in an amount from about 50 to about 70 wt %.

50. A battery according to claim 49 wherein the ethylene carbonate is present in an amount of about 60 wt %.

51. A battery according to claim 50 wherein the propylene carbonate is present in an amount from about 2 to about 10 wt %.

52. A battery according to claim 51 wherein the propylene carbonate is present in an amount of about 5 wt %.

53. A battery according to claim 52 wherein the diethyl carbonate is present in an amount from about 5 to about wt 30 %.

54. A battery according to claim 17 wherein the ethylene carbonate, propylene carbonate, diethyl carbonate, and ethyl methyl carbonate are present in amounts of about 60:5:10:25 wt %.

55. A battery according to claim 17 wherein the ethylene carbonate, propylene carbonate, diethyl carbonate, and ethyl methyl carbonate are present in amounts of about 60:5:25:10 wt %.

56. A battery according to claim 17 wherein the ethylene carbonate, propylene carbonate, diethyl carbonate and ethyl methyl carbonate are present in amounts of about 60:5:5:30 wt %.

57. An electrolyte for use in a lithium battery or cell which contains a lithium metal phosphate cathode comprising methyl ethyl carbonate.

58. An electrolyte according to claim 57 further comprising ethylene carbonate.

59. An electrolyte according to claim 58 further comprising diethyl carbonate or dimethyl carbonate.

60. An electrolyte according to claim 57 further comprising diethyl carbonate.

61. The use of methyl ethyl carbonate in the electrolyte of a lithium battery or cell containing a lithium metal phosphate battery.